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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF APPEALS

Appeal No._____

In re Application of: SUSAN SEBATA ET AL
Serial No.: 10/007,256
Filed: November 11, 2001
For: TWO-SIDED DEPLOYABLE THERMAL RADIATOR SYSTEM AND METHOD

APPELLANTS' BRIEF ON APPEAL

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF APPEALS

In re Application of: SUSAN SEBATA ET AL	:	Date: March 3, 2003
Serial No.: 10/007,256	:	Group Art Unit: 3644
Filed: November 11, 2001	:	Examiner: Tien Q. Dinh
For: TWO-SIDED DEPLOYABLE THERMAL RADIATOR SYSTEM AND METHOD	:	

APPELLANTS' BRIEF ON APPEAL

Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

This appeal is taken from the decision of the Examiner in the Office Action dated October 10, 2002 finally rejecting Claims 1-3 in Paper No. 6 of the above-identified patent application. This brief is submitted in accordance with the provisions of 37 C.F.R. §1.192.

REAL PARTY IN INTEREST

The real party in interest is Space Systems/Loral, Inc. which acquired rights to the present application by way of an assignment from the inventors.

RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to appellants, appellants' legal representative, or the assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

STATUS OF CLAIMS

Claims 1-3 are currently pending in this application and were finally rejected in the Office Action dated October 10, 2002. Appellants appeal from this final rejection.

STATUS OF AMENDMENTS

With regard to the status of amendments, two Office Actions were issued during prosecution of this application. Claims 1-3 were amended in response to the first Office Action dated June 12, 2002. No Claim amendments were made in response to the final Office Action dated October 10, 2002. The Claims as they currently stand are presented in the Appendix.

SUMMARY OF INVENTION

In the specification on page 2, lines 8-27 the following Summary of the Invention is presented: The present invention provides for a spacecraft thermal radiator system that uses two-sided deployable thermal radiators (21-24) that dissipate heat from both front and back surfaces thereof. The use of the two-sided deployable thermal radiators (21-24) enables the thermal radiator system (20) to have approximately 50% more capability than a system with just one surface exposed to dissipate heat.

The present invention provides for an improved spacecraft radiator system (20), spacecraft (10) and spacecraft heat dissipation method. An exemplary spacecraft radiator system (20) comprises first and second opposite facing fixed payload radiators (21, 22) that are thermally coupled to one or more deployable radiators (23, 24) that radiate heat from both sides thereof by way of heat pipes, such as loop heat pipes (25), for example. An exemplary spacecraft (10) comprises a body (11), one or more solar arrays (12), and a spacecraft radiator system (20) comprising first and second opposite facing fixed payload

radiators (21, 22) that are thermally coupled to one or more deployable radiators (23, 24) that radiate heat from both sides thereof.

An exemplary spacecraft heat dissipation method comprises the following steps: A spacecraft is configured to have a body (11), one or more solar arrays (12), first and second opposite facing fixed payload radiators (21, 22), and one or more two-sided deployable radiators (23, 24) selectively coupled to the fixed payload radiators (21, 22) that radiate heat from both sides thereof. The spacecraft (10) is launched into orbit. When in orbit, heat coupled to the opposite facing fixed payload radiators (21, 22) is transferred to the two-sided deployable radiators (23, 24) for radiation into space from both sides thereof.

ISSUES

The issue in this appeal is whether Claims 1-3 are unpatentable under 35 U.S.C. 103A over Drolen in view of Ashton et al and Nakamura et al.

GROUPING OF CLAIMS

With regard to the specific grounds of rejection that are in issue, it is respectfully submitted that Claims 1-3 stand or fall together.

DESCRIPTION OF REFERENCES

In U.S. 5, 787,969 to Drolen et al, filed December 22, 1995, issued August 4, 1998, there is disclosed a closed loop heat pipe transport design for deployment application having a flexible section which connects to a payload structure and a deployable structure. The flexible section is a coil which is offset from the axis rotation of the deployable structure. Upon rotation of the deployable around a predetermined axis, the flexible coil decompresses and sweeps in an arcuet fashion with a portion of said flexible coil aligning the axis. When the deployable structure has completed its rotation and is fully deployed, the flexible coil will rest in substantially the same plane as it did before sweeping.

In U.S. 5,755,406, to Aston et al, filed December 22, 1995, issued May 26, 1998 there is disclosed a space module which has a base and one or more side walls attached to the base. A top panel is attached to one or more side walls so that the base, the one or more side walls and the top panel enclose an interior volume of space which is physically divided into a first area and a second area which are thermally and structurally segregated from one another.

In U.S. 4,880,050 to Nakamura et al, filed June 20, 1988, issued November 14, 1989, there is disclosed a thermal management system for a spacecraft which includes a plurality of T-shaped pallets each having a radiator panel and a mounting panel. The radiator panels are connected end to end to enclose an interior space including the mounting panels. The mounting panels have electronic equipment mounted thereon. L-shaped, external heat pipes contact both the mounting panel and radiator panel of each pallet to provide heat transfer from the electronic equipment to the radiator panel when the radiator panel is facing away from the sun. In order to cool the electronic equipment mounted on the pallet facing the sun, a closed loop heat pipe is disposed in the interior space of each pallet includes L-shaped internal heat pipes contacting the closed loop heat pipe and the mounting panel. Heat generated in the electronic equipment of the pallet facing the sun is transferred to the internal heat pipes via the mounting panel and then to the closed loop heat pipe. The heat then is transferred to the radiator panels facing away from the sun via the closed loop heat pipe, the internal heat pipes, the mounting panels, and the external heat pipes. In one embodiment, the mounting panels are comprised of a pair of spaced apart mounting plates, and the legs of the internal and external L-shaped heat pipes contacting the mounting panel are disposed within this space separating the mounting plates.

ARGUMENT

Claims 1-3 are rejected under 35 U.S.C. 103A as being unpatentable over Drolen in view of Ashton et al and Nakamura et al. It is respectfully submitted that the Examiner's rejection of Claims 1-3 is in error.

The Examiner states that "Drolen et al discloses a spacecraft radiator system having a first and second opposite facing payload radiators, one or more deployable radiators and heat pipes that thermally couple the payload radiators to selected ones of the deployable radiators but lacks the solar arrays and is silent on the heat pipes being thermally coupled to a payload radiator and to a radiator panel on an opposite side of the payload radiator."

"However," the Examiner concludes, "Aston et al discloses that solar arrays are well known in the art." "Furthermore," the Examiner states, "Nakamura et al teaches heat pipes that are used to couple two radiator panels that are on opposite sides are well known in the art.

The Examiner goes on to say, "It would have been obvious to one skilled in the art at the time the invention was made to have used solar panels in Drolen et al's system as taught by Aston et al to generate more electrical power." The Examiner notes that "the method claim is met by the apparatus."

The Examiner further states "it would have been obvious to one skilled in the art at the time the invention was made to have used heat pipes to couple the payload radiators to the deployable panel(s) on the opposite side in Drolen et al's system as taught by Nakamura et al to efficiently control the temperature of the satellite (by transferring heat to the cooler side away from the sun) to prevent damages to onboard equipments.

Appellants respectfully submit that the Drolen et al patent discloses fixed and deployable radiators. Drolen et al discloses that a flex coil 22 is used to couple the fixed and deployable radiators on one side of the spacecraft. However, it is respectfully submitted that Drolen et al does not disclose or suggest that a fixed radiator on one side of the spacecraft may be coupled to a

deployable radiator on the other side of the spacecraft as is done in the present invention. Therefore, it is appellants' position that although Drolen et al discloses that they deployable radiators on one side of the spacecraft are coupled to the fixed radiator on the same side of the spacecraft, Drolen et al does not disclose or suggest coupling any of the radiators on one side of the spacecraft to radiators on the opposite side of the spacecraft.

Appellants respectfully submit that Aston et al does not cure the deficiency of this teaching and Aston et al likewise does not disclose or suggest coupling any of the radiators on one side of the spacecraft to radiators on the opposite side of the spacecraft.

Appellants respectfully contend that Nakamura et al discloses "a thermal management system for a spacecraft which includes a plurality of T-shaped pallets, each having a radiator panel and mounting panel. The radiator panels are enclosed end to end and enclose an interior space including the mounting panels. The mounting panels have electronic equipment mounted thereon. L-shaped external heat pipes contact both the mounting panel and the radiator panel of each pallet to provide heat transfer from the electronic equipment to the radiator panel when the radiator panel is facing away from the sun. In order to cool the electronic equipment mounted on a pallet facing the sun, a closed loop heat pipe is disposed in the interior space and each pallet includes L-shaped internal heat pipes contacting the closed loop heat pipe and the mounting pallet. Heat generated in the electronic equipment of the pallet facing the sun is transferred to the internal heat pipes via the mounting panel and then to the closed loop heat pipe. The heat is then transferred to the radiator panels facing away from the sun via the closed loop heat pipe, the internal heat pipes, the mounting panels and the external heat pipes.

Appellants respectfully submit that Nakamura et al discloses the use of fixed radiators and does not disclose or suggest use of deployable radiators. While Nakamura et al discloses that heat "from a pallet facing the sun...is

transferred to the radiator panels facing away from the sun via the closed loop heat pipe", it is respectfully contended that there is no disclosure or suggestion contained therein regarding "heat pipes that thermally couple each payload radiator to one or more deployable radiators disposed on a side of the spacecraft that is opposite to the respective payload radiator" as is provided in the present invention. Notwithstanding Nakamura et al patent discloses that heat is transferred from the sun-facing side of the spacecraft to the opposite side of the spacecraft, this is neither a teaching or suggestion of transferring heat from one radiator on one side of the spacecraft to a deployable radiator on the opposite side of the spacecraft as provided in the system of the instant invention.

Appellants respectfully contend that the Examiner's rejection would appear necessarily to be based on hindsight reconstruction using the teachings of the cited references in light of appellants' own teachings. Appellants' contention is buttressed by the fact that Drolen et al discloses that deployable radiators on one side of the spacecraft are coupled to the fixed radiator on the same side of the spacecraft and does not couple the radiators on one side of the spacecraft to radiators on the opposite side of the spacecraft as is the case in Aston et al; while Nakamura et al teaches transferring heat from a fixed radiator panel facing the sun to a fixed radiator panel facing away from the sun.

It is, therefore, seen that none of these references discloses either alone or in combination coupling a fixed radiator on one side of the spacecraft to one or more deployable radiators disposed on the opposite side of the spacecraft from the payload radiator as claimed in the claims on appeal.

It is therefore respectfully submitted that neither Drolen et al, Aston et al or Nakamura et al taken singly or together suggest, imply or render obvious the subject matter of Claims 1-3 presently on appeal. Accordingly, Appellants

respectfully request that the final rejection of the Examiner be reversed and that the claims be allowed to go to issue.

Respectfully submitted,

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APPENDIX

Claims 1-3 presented below are currently pending in this application.

1. A spacecraft radiator system for use on a spacecraft having a body and one or more solar arrays, the system comprising:

first and second opposition facing payload radiators;

one or more deployable radiators that radiate heat from both sides thereof; and

heat pipes that thermally couple each payload radiator to the one or more deployable radiators disposed on a side of the spacecraft that is opposite to the respective payload radiator.

2. A spacecraft comprising:

a body:

one or more solar arrays; and

a spacecraft radiator system comprising:

first and second opposite facing payload radiators;

one or more deployable radiators that radiate heat from both sides thereof; and

heat pipes that thermally couple the respective payload radiators to the one or more deployable radiators disposed on a side of the spacecraft that is opposite to the respective payload radiator.

3. A spacecraft heat dissipation method comprising the steps of:

configuring a spacecraft to have a body, one or more solar arrays, first and second opposite facing fixed payload radiators, one or more deployable radiators that radiate heat from both sides thereof, and heat pipes that thermally couple the respective payload radiators to the one or more deployable radiators disposed on a side of the spacecraft that is opposite to the respective payload radiator;

launching the spacecraft into orbit; and

when in orbit, transferring heat coupled to the opposite facing fixed payload radiators to the deployable radiators disposed on the opposite side of the spacecraft for radiation into space from both sides to the deployable radiators.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
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In re Application of: Susan Sebata et al : Date: March 3, 2003
Serial No. 10/007,256 : Group Art Unit: 3644
Filed: November 11, 2001 : Examiner: Tien Q. Dinh
For: Two-Sided Deployable Thermal Radiator System and Method

APPEAL BRIEF TRANSMITTAL LETTER

Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

Enclosed is an Appeal Brief, in triplicate, for the above-identified patent application.

___ Applicant petitions for an extension of time for month(s). If an additional extension of time is required, please consider this a petition therefor.
Fee:

___ An extension for month(s) has already been secured; the fee paid therefore is deducted from the total fee due for the total months of extension now requested.
Extension fee due with this request:

_X_ Applicant believes that no extension of time is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition for extension of time.

___ The Appeal Brief Fee was paid in a prior appeal in which there was no decision on the merits by the Board of Appeals.

_X_ The Appeal Brief Fee is enclosed herewith. Fee: $320.00

_X_ The total fee due is $320.00

_X_ Address all correspondence to Joyce Kosinski, Karambelas & Associates, 655 Deep Valley Drive, Suite 303, Rolling Hills Estates, CA 90274.

This letter is submitted in triplicate.

Respectfully submitted,

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PATENT
Docket No. YR1-52

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT:	Susan Sebata et al
SERIAL NUMBER:	10/007,256
FILING DATE:	November 11, 2001
FOR:	Two-Sided Deployable Thermal Radiator System and Method
GROUP ART UNIT:	3644
EXAMINER:	Tien Q. Dinh

CERTIFICATE OF MAILING
UNDER 37 CFR 1.8

The Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

Identification of Transmitted Papers

Appeal Brief in triplicate, Appeal Brief Transmittal Letter in triplicate, Check in the Amount of $320.00, return receipt postcard

I hereby certify that the above-identified correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231 on **March 3, 2003**.

Joyce E. Kosinski
Depositor

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